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| Serial No.: | 10/709,699 | Art Unit: | 2818 |
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**IN THE CLAIMS**

**Cancel claims 1-16 without prejudice to prosecution thereof in a divisional application.**

**Claims 1-16 (canceled)**

**Claim 17 (amended): A semiconductor device on a semiconductor substrate, comprising:**  
**a wide trench and a narrow trench in the substrate;**  
**a first electrode formed in the narrow trench composed of a first fill material of a first conductivity type;**  
**a second electrode formed in the wide trench composed of a second fill material of an opposite conductivity type; [[and]]**  
**a first outdiffusion region doped with dopant diffused from the first electrode into a region in the substrate about the periphery of the narrow trench; and**  
**a second outdiffusion region doped with dopant diffused from the second electrode into a region in the substrate about the periphery of the wide trench.**

**Claim 18 (previously presented): The device of claim 17 wherein the semiconductor device is a photodetector.**

**Claim 19 (previously presented): The device of claim 17 wherein an epitaxial silicon layer is formed on trench sidewalls of the wide trench leaving a space filled with the second electrode narrowing the wide trench from a width  $W_{WIDE}$  to a width  $W_{W R}$ .**

**Claim 20 (previously presented): The device of claim 19 wherein the wide trench with the epitaxial layer formed on trench sidewalls has the same opening [[size]] width  $W_{W R}$  as the narrow trench width  $W_{NARROW}$ .**

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**Claim 21 (new):** The device of claim 17 with a liner is deposited on the walls of the narrow trench and the wide trench.

**Claim 22 (new):** The device of claim 17 including:

**a contact to the first electrode, and**

**a contact to the second electrode.**

**Claim 23 (new):** The device of claim 17 including a pad layer formed over the substrate aside from the trenches with the pad layer comprising a layer through which light passes.

**Claim 24 (new):** The device of claim 17, wherein:

**the material of the first conductivity comprises N-type doped polysilicon: and**

**the material of the second conductivity comprises P-type doped polysilicon.**

**Claim 25 (new):** The device of claim 18, wherein:

**the material of the first fill material comprises N-type doped polysilicon: and**

**the material of the second fill material comprises P-type doped polysilicon.**

**Claim 26 (new):** The device of claim 17, wherein the semiconductor substrate is formed over a buried oxide layer.

**Claim 27 (new):** The device of claim 17, wherein the semiconductor substrate is composed of a material selected from the group consisting of Si, strained Si,  $\text{Si}_{1-y}\text{C}_y$ ,  $\text{Si}_{1-x-y}\text{Ge}_x\text{C}_y$ ,  $\text{Si}_{1-x}\text{Ge}_x$ , Si alloys, Ge, Ge alloys, GaAs, InAs, InP as well as other III-V semiconductors, II-VI semiconductors, Si-containing materials, a Silicon-On-Insulator (SOI) substrates or a SiGe-On-Insulator (SGOI) substrates.

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**Claim 28 (new):** The device of claim 17, wherein the liner material is composed of a material selected from a group consisting of silicon nitride, Ge, SiGe, WSix, TiN, Ta, Ti, and SiC.

**Claim 29 (new):** A photodetector device formed on a semiconductor substrate, comprising:

a wide trench and a narrow trench formed in the substrate;

a first electrode formed in the narrow trench of a deposit of a first fill material of a first conductivity type filling the wide trench partially and filling the narrow trench completely;

an epitaxial semiconductor layer formed in the wide trench leaving a narrowed wide trench therein;

a second electrode formed in the wide trench by a second fill material of an opposite conductivity type;

dopant diffused from the second electrode into a region in the substrate about the periphery of the wide trench; and

dopant diffused from the first electrode into a region in the substrate about the periphery of the narrow trench.

**Claim 30 (new):** The photodetector device of claim including a pad layer is formed over the substrate aside from the trenches with the pad layer comprising a layer through which light passes.

**Claim 31(new):** The photodetector device of claim 29, wherein

a first liner is formed on the walls of the narrow trench; and

the first fill material is deposited within the first liner inside the narrow trench.

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**Claim 32 (new): The photodetector device of claim 31, wherein:**

**a second liner is formed on the walls of the narrowed wide trench; and**  
**the second fill material is deposited within the second liner inside the narrowed wide trench.**

**Claim 33 (new): The photodetector device of claim 32, wherein the first liner and the second liner is composed of a material selected from a group consisting of silicon nitride, Ge, SiGe, WSix, TiN, Ta, Ti, and SiC.**

**Claim 34 (new): The photodetector device of claim 31 including:**

**a silicide contact to the first electrode and**  
**a silicide contact to the second electrode.**

**Claim 35 (new): A semiconductor device comprising an array of lateral trench p-i-n photodiodes connected in parallel formed on a semiconductor substrate, comprising:**

**an array of parallel trenches formed in the substrate comprising alternating wide trenches and narrow trenches;**

**a plurality of first electrodes with each thereof formed in one of the narrow trenches, each first electrode being composed of a first fill material of a first conductivity type;**

**a plurality of second electrodes with each thereof formed in one of the wide trenches, each second electrode being composed of a second fill material of an opposite conductivity type;**

**a first set of outdiffusion regions doped with dopant diffused from a first electrode into a region in the substrate about the periphery of the corresponding narrow trench; and**

**a second set of outdiffusion regions doped with dopant diffused from a second electrode into a region in the substrate about the periphery of the wide trench about the periphery of the corresponding wide trench.**

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**Claim 36 (new): The device of claim 35 including**

**a pad layer formed over the substrate aside from the trenches with the pad layer comprising a layer through which light passes;**

**a first liner is formed on the walls of the narrow trench and the first fill material is deposited within the first liner inside the narrow trench;**

**a second liner is formed on the walls of the narrowed wide trench and the second fill material is deposited within the second liner inside the narrowed wide trench; and**

**the liner material is composed of a material selected from a group consisting of silicon nitride, Ge, SiGe, WSix, TiN, Ta, Ti, and SiC.**